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ABSTRACT

Piaget's egocentrism and Witkin's psychological differentiation are important constructs in theories of cognitive development. A comparison of these concepts could lead to an increased understanding of cognitive development in the older adult. In a test of Witkin's revised model of psychological differentiation, the Portable Rod and Frame Test (PRFT), Group Embedded Figures Tests (GEFT), a spatial egocentrism task, and a role-taking egocentrism task were administered to 46 older adults. Combined measures of field-dependence and egocentrism were highly related. Measures of egocentrism correlated more highly with measures of field-dependence than with each other. Results indicating that the PRFT measures a more pervasive higher-order factor than the GEFT lend support to Witkin's revised model of psychological differentiation. The significant effects due to age, education, and error-type point out the importance of examining mediating variables when attempting to validate psychological theories. (Author/NRB)

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Egocentric Behavior and Psychological Differentiation in the Aged[1]

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Egocentric Behavior and Psychological Differentiation in the Aged[1]

Two major approaches to the study of cognitive development have been delineated in the theories of Jean Piaget and Herman Witkin. These theories share certain common features, as in Piaget's construct of egocentrism and Witkin's construct of psychological differentiation, which make an empirical comparison between them possible. The present study was undertaken to make such a comparison and thereby contribute to an increased understanding of cognitive development in the older adult.

Egocentrism is an important concept in the writings of Jean Piaget and has been dealt with by various other authors in psychological literature (for reviews see Chandler, 1977; Ford, 1979; Looft, 1972; Papalia & Bielby, 1974; Shantz, 1975). It has been variously defined as the "inability to decenter" (Feffer, 1970; Piaget, 1950), a general "lack of differentiation" (Looft, 1972), and "an imbeddedness in one's own view" (Rubin, 1973). Depending on the experimenter's interest in a particular type of process or inference, research in this area has gone under a variety of generic labels including: social cognition, person perception, empathy, egocentrism, and role taking (Shantz, 1975).

The studies initially conducted by Witkin and his associates concerning the perceptual style of field-dependence-independence derives mainly from the theoretical work on differentiation by Heinz Werner (1948). Field-dependent individuals are described as experiencing the environment in a global fashion, having a relatively unarticulated body concept, possessing a diminished sense of separate identity, and relying on the frame of reference provided by the physical and social surroundings (Witkin & Berry, 1975).

The primary question to be dealt with here is what relationship exists between psychological differentiation and egocentrism. Egocentric and field-dependent individuals have been characterized similarly in the psychological

literature (e.g., Elkind, Koegler, & Go, 1964; Flavell, Botkin, Wright, & Jarvis, 1968; Langer, 1970). Recently Witkin (Witkin, Goodenough, & Oltman, Note 1) has proposed a revised model of psychological differentiation which represents spatial visualization (such as is measured by Piaget's three-mountain task) and interpersonal competencies (such as role taking abilities) as separate, lower-order factors while field-dependence is viewed as a higher-order factor. Past studies investigating the relationship between these two constructs have found significant correlations, generally ranging between .27 and .33 (Bowd, 1975; Citrebaum, 1975; Finley, Solla, & Cowan, 1977; Harpenau, 1967; Knudson & Kagan, 1977; Satterly, 1976) although correlations as high as .68 and .90 have been noted (Assawamatiyanont, 1971; Okonji & Olagbaiye, 1975). The majority of these studies, however, have not been directly interested in assessing this relationship and report these findings as supplemental analyses which are tangential to the main results.

While the above researchers suggest that there exists a significant relationship between egocentrism and field-dependence, several methodological considerations limit the generality of their findings (see Kurdek, 1978). First, none of these studies have investigated the proposed relationship beyond the adolescent period. Second, only single measures of egocentrism and field-dependence have been used. Third, possible mediating variables such as the subject's level of education, sex of subject, and type of scoring system used have been largely ignored. The present investigation overcomes the restricted designs of previous studies by using multiple measures of each construct. In addition, the age range was extended by using an older adult age group. Important mediating variables such as levels of education, sex, age, and error type were also examined.

Method

Subjects

A group of 46 subjects (mean age 70.6 years, standard deviation 6.2 years, range 60 to 84 years) was tested in the present experiment. Twenty-three males and 23 females from primarily urban residences were included in the study. The selection of this age range was based on current research concerning the development of egocentrism and psychological differentiation in older adults (Bielby & Papalia, 1974; Comalli, 1965, 1970; Kogan, 1973; Looft & Charles, 1971; Schultz & Hoyer, 1976). The modal educational level completed by the subjects was eighth grade (range less than eighth grade to beyond college).

Procedure

Each subject was tested individually by the same male experimenter in a private room. The order of presentation of all perceptual style measures and egocentrism tasks was counterbalanced across all subjects. There was at least a five-minute rest period between all tasks during which the subjects were encouraged to relax. Total testing time was approximately 1½ hours for each subject.

Upon arrival, each subject was asked to complete a Health and Biographical Information Questionnaire. Participants were introduced to the testing situation by being told that they would be asked for their responses or opinions to a series of experimenter-described problem situations. Subjects were allowed to ask questions at the end of each set of task instructions, before the task began.

Measures of Egocentrism

Egocentrism was measured by subjects' performance on Flavell's Spatial Egocentrism Task (Flavell et al., 1968) and Miller's Role Taking Task (Miller et al., 1970).

Spatial Egocentrism Task. Spatial egocentrism was measured with task 1C of Flavell et al. (1968). Four stimulus displays were separately presented to each subject in an invariant sequence of 1-2-3-4. The elements of each display were fastened to a 15 x 15 inch board in order to keep their spatial relationship constant. Each display was placed in the middle of a table and the subject seated facing it. The experimenter always sat first 90 degrees to the subject's right and then opposite the subject for each display. The subject was instructed to reconstruct the experimenter's view each time, with a set of similar stimulus elements on a small desk directly to the subject's right.

The displays were presented in order of difficulty, from easiest to hardest. Each succeeding display placed an additional demand on the subject by adding a new feature that had to be taken into account in attempting to reproduce the experimenter's perspective. Only with display one was the subject allowed a second opportunity to arrange the materials if it was initially failed. Display one was comprised of a single blue wedge of wood. Display two consisted of three identical blue wood cylinders in a spatial arrangement. Display three had three blue wood cylinders of differing height. Display four had three cylinders of differing height, each of which was red for half its circumference and blue for the other half.

Each of the subject's reconstructions was traced on an underlying sheet of paper and other necessary notations regarding position, height, and color were made. Scoring consisted of superimposing a transparent template over each reconstruction tracing and assigning it a value according to a standard scoring system. The subject's score was the total points assigned for all eight reconstructions. A maximum score of 36 could be obtained by subjects.

A second scoring procedure was also used to assess for the incidence of egocentric versus non-egocentric errors. On each trial any subject errors were scored as egocentric (reconstructing one's own view) or non-egocentric (reconstructing one of the other two incorrect views). The frequency of

these two types of errors were combined for the eight trials to give a total score for each subject.

Role Taking Egocentrism Task. Role-taking egocentrism was measured with a task similar to that of Miller et al. (1970) and Rubin (1973). Each subject was taught to label the line-drawing cartoon faces of a boy, a girl, a mother, and a father. In addition each subject was taught the difference between scalloped cartoon clouds, representing thinking, and smooth clouds which represent talking.

Eighteen drawings were then successively presented to the subject, each belonging to a category of recursive thought. The four categories of recursive thinking represented by the cartoon drawings were: thinking about contiguous individuals ("The boy is thinking of the mother."); thinking about action between individuals ("The boy is thinking that the girl is talking to him."); one-loop recursive thinking ("The boy is thinking that he is thinking of the girl."); and two-loop recursive thinking ("The boy is thinking that he is thinking of the girl thinking of herself."). For each subject, presentation of the drawings was randomly ordered. For each drawing the subject was asked what the boy is thinking. All sessions were tape-recorded.

Scoring consisted of rating responses as either correct (1 point) or incorrect (0 points) according to a set of standard scoring criteria. The subject's score was the total points assigned for all 18 responses.

Measures of Psychological Differentiation

Psychological differentiation was measured by subjects' performance on the Portable Rod and Frame Test (Oltman, 1968) and the Group Embedded Figures Test (Witkin, Oltman, Raskin & Karp, 1971).

Portable Rod and Frame Test. The Portable Rod and Frame Test was administered to all subjects according to the procedures and instructions stated by Oltman (1968). A standard Portable Rod and Frame Test apparatus from the Polymetric Company, model V-1260-A, was used. This task requires the subject to direct

the experimenter's adjustment of a rod, which is located within a tilted frame, to a position he perceives as upright. No time limits are involved in this task.

Scoring consisted of taking the total number of degrees of error over eight trials for each subject.

Group Embedded Figures Test. The Group Embedded Figures Test was administered to all subjects according to the instructions in the test booklets, published by Consulting Psychologists Press. This test consists of an initial practice section of seven simple figures and two equivalent test sections of nine complex figures each. The subject must find and trace a simple form that is hidden within a more complex form. There is a two minute time limit for the practice session and a five minute time limit for each of the test sections.

Scoring consisted of totaling the number of simple forms in the second and third sections correctly traced by each subject.

Additional Measures

Health and Biographical Information Questionnaire. A questionnaire assessing objective self-reported health (the number of "yes" answers on a list of 15 common health problems in the aged), subjective ratings by subjects of their perceived overall level of health, educational level, occupation, age, and marital status was completed by each subject. Responses consisted of circling the appropriate choice category and short answer fill-ins.

Results and Discussion

In order to investigate the relationship between combined measures of egocentrism and field dependence, a canonical correlation analysis was conducted (see Table 1). As expected, combined measures of egocentrism and field-dependence were highly related (r=.72). However, measures of egocentrism

correlated more highly with measures of field-dependence (.46 to .61 range[3]) than they did with each other (r=.28) (see Table 2). Measures of field-dependence were also significantly correlated (r=.66). The second canonical variate was not significant. No significant relationship with sex of subject or health status was found.

Unlike the egocentrism tasks, the canonical coefficients used in computing the linear combination of field-dependence measures showed an apparent asymmetry. The Portable Rod and Frame Test received a weight almost twice that of the Group Embedded Figures Test. Thus, although the Portable Rod and Frame Test (r=.96) and the Group Embedded Figures Test (r=.85) were both highly correlated with the linear combination of egocentrism measures, the Group Embedded Figures Test did not make a large contribution over that provided by the Portable Rod and Frame Test.

These results provide some support for Witkin's revised model (Figure 1) which proposes that the Portable Rod and Frame Test taps a higher-order field-dependence-independence factor directly, whereas the Group Embedded Figures Test represents a general cognitive restructuring ability below this level. The egocentrism tasks are seen as measuring separate, lower-order factors.

Further inspection of Table 2 does reveal significant correlations of age and level of education with the measures of egocentrism and psychological differentiation. Thus, age and education may be intervening variables which affect the relationship between the measures of interest. In an attempt to independently look at the effects of these two variables, subjects were classified in one of two age groups (60-69 years and 70-84 years) and one of three levels of education completed (less than high school, high school, college and above). This selection was based on the dispersion of subjects' ages and levels of education which indicated these groupings to be natural cutting points containing approximately equal numbers of subjects. Separate analyses

[3]All correlations reported in text are absolute values.

of variance for the egocentrism and psychological differentiation measures were conducted for the factors of age and level of education.

Tables 3 and 4 show the findings for the analyses of variance on field-dependence and egocentrism measures. Results indicated that the 70-84 year old age group was more egocentric on the Role Taking Egocentrism Task, $F(1,40)=4.36$, $p<.05$, and, more field-dependent on the Portable Rod and Frame Test, $F(1,40)=3.90$, $p<.05$, than the 60-69 year old age group. No difference between age groups on the Spatial Egocentrism Task or the Group Embedded Figures Test was found. The findings are inconsistent between different measures of the same construct and do not provide strong support for the contention of some authors that increasing age is associated with increases in field-dependence (e.g., Comalli, 1970; Markus, 1971; Markus & Neilson, 1973) and egocentrism (e.g., Looft & Charles, 1971; Rubin, Attewell, Tierny, & Tumolo, 1973). The inconsistency may be the result of different component mental operations being involved in the various tasks (see Sternberg, 1977, 1979).

The analyses of variance for age groups and levels of education showed significant main effects for level of education on the Role Taking Egocentrism Task, $F(2,40)=8.85$, $p<.001$, the Portable Rod and Frame Test, $F(2,40)=3.52$, $p<.05$, and the Group Embedded Figures Test, $F(2,40)=12.14$, $p<.001$. No difference between levels of education was found on the Spatial Egocentrism Task. A posteriori Newman-Keuls tests showed individuals with a college or greater education to be less egocentric on the Role Taking Egocentrism Task and less field-dependent on the Portable Rod and Frame Test and Group Embedded Figures Test than individuals with less than high school and high school education. The latter two groups did not differ on any of the measures. These results support previous research which has found significant educational differences in individuals' performance on the Portable Rod and Frame Test (Gruenfeld & MacEachron, 1975) and the Embedded Figures Test (Tramer & Schluderman, 1974). Although the present findings are less consistent with

regard to egocentrism, they do not provide strong support for the position that degree of egocentrism is entirely independent of level of education (see Bielby & Papalia, 1975).

Using an alternative method of looking at the effects of the subjects' age on the measures of interest, independent of level of education, an analysis was performed on the relationship between variables in this study with the effects of level of education partialed out (see Table 5). The results supported the findings from the analyses of variance. Age was significantly correlated with performance on the Role Taking Egocentrism Task and the Portable Rod and Frame Test but not the Spatial Egocentrism Task or the Group Embedded Figures Test. The results also showed that the measures of field-dependence remained significantly correlated (r=.60) while the measures of egocentrism were no longer correlated significantly (r=.13). In line with previous research (e.g., Ford, 1979; Kurdek, 1977; Rubin, 1978) the present results do not support the validity of a single underlying egocentrism or decentration construct.

An analysis of variance was conducted for the factors of age group, subject (nested within age group), view, and error type on the Spatial Egocentrism Task (see Table 6). Results indicated a significant main effect for age groups, with the frequency of both egocentric and non-egocentric errors increasing with age, $F(1,44)=4.87$, $p<.05$. Thus, the contention of some authors (e.g., Schultz & Hoyer, 1976; Tesch, Whitbourne & Nehrke, 1978) that the poorer performance of older adults on this task is simply the result of non-egocentric errors was not supported. Decreased performance of older adults on perspective-taking tasks, while partially due to cognitive-perceptual confusion, cannot be explained solely by this type of error. Inspection of frequency ratios of egocentric to non-egocentric errors indicated that egocentric responding was not the result of random guessing, thus lending conceptual validity to the existence of an "egocentric response" (see Table 7).

The analysis of variance also resulted in a significant main effect for view, $F(1,44)=19.28$, $p < .001$, and a significant view X error type interaction $F(1,44)=8.25$, $p < .01$). This indicates a greater number of errors for the opposite view (180^0) as compared to the side view (90^0); whereas the frequency of non-egocentric errors increases when the subject must reconstruct the experimenter's view in the opposite position, the frequency of egocentric errors remains the same. This pattern of findings was similar for both age groups. The greater difficulty of the opposite view supports findings from previous research (Cox, 1977, 1978) and implies underlying mental processes similar to those studied by Shepard and his colleagues (Cooper, 1975; Cooper & Shepard, 1973; Shepard & Metzler, 1971).

In an attempt to further clarify the relationship between egocentrism and field-dependence as proposed by Witkin's midel, an additional egocentrism measure was subsequently administered to subjects. This task was adapted from Flavel et al. (1968) and requires subjects to detect inadequacies in a set of directions given to a hypothetical traveller who is attempting to reach a particular destination indicated on a map. Since this task requires a great amount of spatial ability, it was expected that it would measure the same factor as the Spatial Egocentrism Task. Thus, this task should correlate most highly with the Spatial Egocentrism Task and then show a decreasing set of correlations with the middle-order Group Embedded Figures Test, higher-order Portable Rod and Frame Test, and lower-order Role Taking Egocentrism task respectively.

The obtained Pearson correlation matrix provided partial confirmation of these expectations. The new egocentrism measure correlated .44 with the Spatial Egocentrism Task, .42 with the Portable Rod and Frame Test, .36 with the Group Embedded Figures Test, and .30 with the Role Taking Egocentrism Task. The spread of these correlations, however, is insufficient to reach any definite conclusions. It is recommended that a future study be conducted using path analysis techniques to further validate this model.

With the addition of the new egocentrism task, a canonical correlation analysis showed combined measures of field-dependence and egocentrism to be related (r=.73) at approximately the same level as the initial analysis. Although the new egocentrism task was highly correlated (r=.60) with the linear combination of field-dependence measures, it received a canonical weight only one-third that of the other egocentrism measures. Thus, the new egocentrism task's effects seem to be masked since it does not appear to make any additional contribution over that provided by the Spatial Egocentrism Task.

In summary, the results highlight the importance of using multiple measures in investigating constructs such as egocentrism and field-dependence. Partial support was found for Witkin's revised model of psychological differentiation. However, the significant effects due to age, education, and error type point out the importance of examining mediating variables when attempting to validate psychological theories.

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Table 1

Canonical Correlation Analysis

Canonical Variate	Canonical Correlation	Explained Variance (%)	Wilk's Lambda	Barlett's Chi-Square	DF
1	.72	51.8	.48	32.7***	4
2	.20	3.9	.96	1.7	1

Canonical Coefficients

	Variate 1	Variate 2
Group Embedded Figures Test	-.39	-1.27
Portable Rod and Frame Test	.70	-1.13
Role Taking Egocentrism Task	-.56	- .86
Spatial Egocentrism Task	-.69	.78

Table 1 (continued)

	Variate-Variable Correlations	
	Variate 1	Variate 2
Group Embedded Figures Test	-.85	-.52
Portable Rod and Frame Test	.96	-.29
Role Taking Egocentrism Task	-.75	-.66
Spatial Egocentrism Task	-.85	.53

***p < .001

Table 2

Pearson Correlation Matrix All Subjects (N = 46)

Variable	Sex	Education	Spatial Egocentrism	Role Taking Egocentrism	Portable Rod and Frame	Group Embedded Figures	Objective Health	Self-Rated Health
Age	-.11	-.42**	-.33**	-.41**	.36**	-.38**	.18	-.11
Sex		-.09	-.23	-.03	.30*	-.21	-.28*	-.07
Education			.38**	.49***	-.34**	.59***	-.04	-.12
Spatial Egocentrism				.28	-.61***	.45***	.00	-.07
Role Taking Egocentrism					-.48***	.53***	.11	.02
Portable Rod and Frame						-.66***	-.07	.11
Group Embedded Figures							.01	-.21
Objective Health								.34**

Note: Significance levels are for a one-tail test.

*$p < .05$

**$p < .01$

***$p < .001$

Table 3

2 X 3 Analyses of Variance for Psychological Differentiation Tests

	Source	SS	DF	MS	F
Portable Rod and Frame	Age Group	19429.395	1	19429.395	3.950*
	Education	34644.789	2	17322.395	3.522*
	Age Group x Education	5467.453	2	2733.727	0.556
	Residual	196759.063	40	4918.977	
	Newman-Keuls Procedure on Education		1	2	3*
Group Embedded Figures	Source	SS	DF	MS	F
	Age Group	6.596	1	6.596	0.528
	Education	304.347	2	152.173	12.174***
	Age Group x Education	4.210	2	2.105	0.168
	Residual	499.987	40	12.500	
	Newman-Keuls Procedure on Education		1	2	3*

*$p < .05$

***$p < .001$

Table 4

2 X 3 Analyses of Variance for Egocentrism Tasks

Role Taking Egocentrism	Source	SS	DF	MS	F
	Age Group	45.929	1	45.929	4.366*
	Education	185.885	2	92.943	8.835**
	Age Group x Education	27.010	2	13.505	1.284
	Residucal	420.786	40	10.520	
	Newman-Keuls Procedure on Education	1	2	3*	
Spatial Egocentrism	**Source**	**SS**	**DF**	**MS**	**F**
	Age Group	184.639	1	184.630	2.374
	Education	354.109	2	177.055	2.276
	Age Group x Education	69.739	2	34.870	.448
	Residual	3111.462	40	77.787	
	Newman-Keuls Procedure on Education	1	2	3*	

*$p < .05$

**$p < .01$

Table 5

Partial Correlation Matrix All Subjects (N = 46)

Variable	Sex	Spatial Egocentrism	Role Taking Egocentrism	Portable Rod and Frame	Group Embedded Figures
Age	-.17	-.20	-.26*	.25*	-.18
Sex		-.22	.02	.29*	-.20
Spatial Egocentrism			.13	-.56***	.32**
Role Taking Egocentrism				-.38**	.34**
Portable Rod and Frame					-.60***

*p < .05
**p < .01
***p < .001

Table 6

2 X 46 X 2 X 2 Analysis of Variance for Spatial Egocentrism

Source	SS	DF	MS	F
Age Group	6.0686	1	6.0686	4.8725*
Subject (Age Group)	54.8010	44	1.2455	
View	4.2609	1	4.2609	19.2799***
Error Type	.3478	1	.3478	.1899
Age Group X View	.0151	1	.0151	.0683
Subject (Age Group) X View	9.7240	44	.2210	
Age Group X Error Type	.0512	1	.0512	.0280
Subject (Age Group) X Error Type	80.6010	44	1.8318	
View X Error Type	4.2609	1	4.2609	8.2502**
Age Group X View X Error Type	.0151	1	.0151	.0292
Subject (Age Group) X View X Error Type	22.7240	44	.5165	

*$p < .05$
**$p < .01$
***$p < .001$

Table 7

Frequencies of Egocentric, Non-Egocentric, and Total Errors For Age Groups and Views on the Spatial Egocentrism Task

	Young-Old Age Group (N=20)			Old-Old Age Group (N=26)		
View	Side	Opp.	Both	Side	Opp.	Both
Egocentric Errors	12	12	24	26	26	52
Non-Egocentric Errors	8	21	29	20	36	56
Total Errors	20	33	53	46	62	108

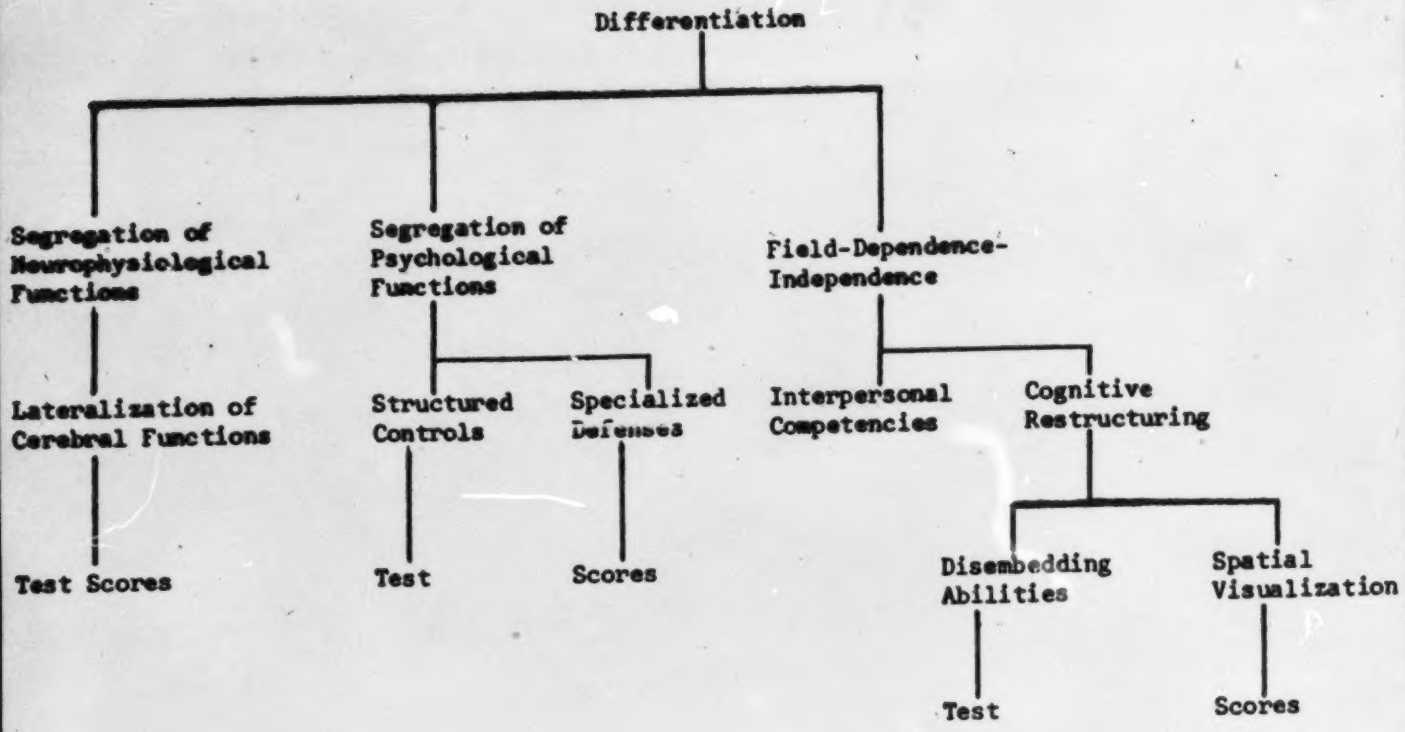

Figure 1. 1977 Version of Psychological Differentiation Theory